# Warfighter Effectiveness Research Center

United States Air Force Academy

Biannual Newsletter
VOL. 1, ISSUE 2 JUNE 2015

Photo by Liz Copan (DMI)

In this issue

Visitors to the WERC Pgs 2-3
Featured Projects Pgs 4-5
Publications, Media, & the WERC Team Pg 6

## From the Director...

Wow! What a first year! The entire WERC team and the Department of Behavioral Sciences and Leadership are very excited about this year's accomplishments. As you will see in this second issue of our newsletter, we participated in over 50 research presentations this year, added three new members to the WERC team, traveled to many locations around the world to discuss and accomplish behavioral science research for the DoD, and increased our annual budget by 500%!

One of our largest accomplishments this year was hosting the Air Force Office of Scientific Research annual Trust and Influence program review including a keynote address by LtGen Michelle Johnson (Academy Superintendent) and Dr. Mica Endsley (Chief Scientist of the Air Force). We also stood-up an international division and a new Unmanned Aircraft Systems research portfolio. In addition, we visited with researchers from Colorado State University, California State University, University of Notre Dame, and the Air Force Research Laboratory, to name a few.

Our accomplishments are a reflection of our generous donors and the many collaborators that are joining us on this important mission to support the warfighter with Behavioral Science solutions. Thank you for your support!

Best,
LtCol Chris McClernon
Director

## WERC MISSION

Facilitate faculty and cadet research in the Behavioral Sciences through collaborative efforts to enhance warfighter effectiveness

## WERC PRIORITIES

1. Enable the warfighter
2. Facilitate faculty and cadet research
3. Create and sustain collaboration via relationship-building with DoD, industry, and university partners

*Above: Attendees at the AFOSR Program Review hosted by the WERC included (from left to right): LtCol McClernon, LtGen Michelle Johnson, Dr. Mica Endsley, Col Gary Packard, Dr. Ben Knott.*

# WERC Hosts AFOSR Program Review

## Dr. Ben Knott's Trust and Influence program review was held at the USAF Academy; his funded investigators reported on a year of research.

The Air Force Office of Scientific Research portfolio on Trust and Influence (Dr. Ben Knott, Program Officer) funded our first year of WERC execution with a small seedling grant. Dr. Knott visited the WERC in the fall to see our research capability, meet with cadets, and discuss long-term research collaborations. During his visit he invited us to his program review, typically held in Alexandria, VA. We were honored by his invite, but after visiting with us in beautiful Colorado for two days he suggested, "What if we held the review here?"

After six months of planning, Dr. Knott's staff and the WERC Action Officer, Captain Celaya, organized an outstanding event at the Academy's Eisenhower Golf Course including 49 research talks, social events, and countless research breakout sessions. Keynote addresses were also added to the agenda including LtGen Michelle Johnson (Academy Superintendent), Dr. Mica Endsley (Chief Scientist of the Air Force), BGen Andrew Armacost (Academy Dean), Col Gary Packard (Chair, Behavioral Sciences & Leadership Department and Social Science Division), and LtCol Chris McClernon (WERC Director).

Photo by Liz Copan (DMI)

*Left: LtGen Johnson, Academy Superintendent, addresses the program review attendees before introducing Dr. Mica Endsley (above).*

The WERC seedling proposal is a diverse approach to addressing current Air Force issues in the Behavioral Sciences including organizational trust, complex distributed decision making, and aircraft automation. The seedling involved 42 cadets, generated 8 studies and produced 17 publications and presentations in 9 months.

While weather and a heightened security posture attempted to spoil the event, the program review was a success! Thanks to all of the personnel at AFOSR and Captain Celaya for making this a memorable research event.

### *Air Force Chief Scientist Visits the WERC*

Dr. Mica Endsley is the current Air Force Chief Scientist. She has a background in Behavioral Sciences, specifically Human Factors Engineering, and her research interests include situation awareness, decision-making, human-automation integration, human error, and human-system integration. Therefore, it was very fitting for her to discuss trust, influence, and automation from an Air Force perspective.

While she was visiting the Academy for the program review, she accepted an invitation to spend a day with researchers in the WERC. We discussed WERC research focusing on the Human Factors portfolio, the Human Factors curriculum at USAFA, and the future of the Behavioral Scientist career field in the Air Force.

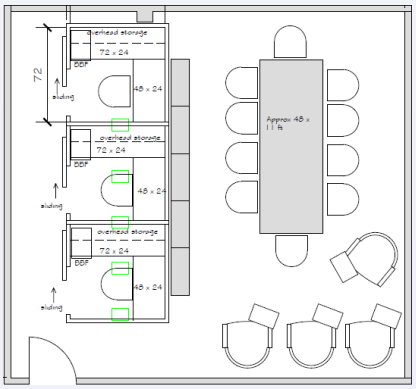
*Drs. Wil Scott and Karin DeAngelis give Dr. Endsley and Col Anne Clark a tour of the Socio-Cultural Laboratory*


## WERC Builds a New Collaboration Room

As you can see (pgs. 3-5), we have a lot of visitors to the WERC. Until now, our visitors happily reside in a spare office or common meeting area during the extent of their visit. However, we have many researchers that are interested in residing in the WERC more long-term to collect data or even perform a research sabbatical from their home organization.

To accommodate more long-term visits to the WERC and to facilitate faculty and cadet collaboration we are building a state-of-the art collaboration room. This room will have three cubical workspace areas, configurable furniture, video teleconference capability, Smart boards, commercial Wifi, and both hardcopy and electronic libraries. Part of this project includes a refurbishment of our current conference room for use by researchers, DFBL faculty, and visitors alike.

Capt Aaron Celaya is managing this effort, and we are anticipating a September 2015 ribbon cutting ceremony. If you are interested in residing in the WERC either short-term or long-term, we now have a space for you! Please contact us regarding visits at werc@usafa.edu.




*Plans for the WERC's new collaboration room to be unveiled in September 2015.*

# Visits (continued)...

### *German Armed Forces Psychologist Arrives*

In January, Mrs. Michaela Schuster (USAF O-5 equivalent) arrived from the German Armed Forces. Michaela is a Psychologist investigating the mental health impacts of RPA operations on co-located military families. She is collaborating with the WERC's Dr. Wil Scott and AFRL's Dr. Wayne Chappelle. She is planning a data collection effort this Fall at Creech AFB and Cannon AFB.

### *Notre Dame Researchers Continue Study on Religion at USAFA*

Dr. Mary Ellen Chwedyk and Ms. Megan Rogers (University of Notre Dame), visited again to continue their data collection investigating how religion at USAFA reflects larger national patterns of religion and citizenship. They are collaborating with Dr. Wil Scott and Capt Monica Herrera (DFBL).

### *Cyber Exercise*

The WERC's Dr. Vic Finomore and AFRL's Ms. Lauren Menke supported a data collection effort at USAFA during the NSA's 15th Annual Cyber Defense Exercise. Cadets on the Cyber Competition Team participated in a 2.5 day cyber security competition against other service academies involving NSA cyber attacks on their net-

works. This exercise afforded a realistic, intense cyber operation for our research team to collect physiological data on the participants. This data will be used to gain a better understanding of cyber operators and to build models to sense and assess the stress, workload, and trust biomarkers for cyber operators.

### *Mathew Sharps*

Dr. Mathew Sharps (California State University-Fresno) visited the WERC to discuss a research project applying his SMOKE model for bomb detection to threat detection in an RPA scenario. We visited many potential data collection sites at the Academy and developed a few research scenarios. Dr. Sharps will spend part of his sabbatical in the WERC next Spring.

### *Colorado State University Collaboration kicks-off*


Col Packard, Capt Ashely Pugh, and the WERC team visited the Psychology Department at CSU to discuss research collaborations. Dr. Kevin Murphy then visited the WERC to finalize a research project on critical thinking and leadership assessment. The project is funded by ARI and the WERC PI is Capt Steve Raymer.

### *Dr. Robert Patterson Visits from AFRL*

Dr. Robert Patterson took time out from his Colorado vacation to visit the WERC, discuss potential collaborations, and give a brown bag on human decision making in the context of human-machine systems research. Dr. Patterson is a Cognitive Psychologist at AFRL, and he left a signed copy of his latest book for the WERC library.

Are you interested in visiting the WERC and discussing potential collaboration opportunities? If so, please contact Capt Aaron Celaya at aaron.celaya@usafa.edu or 719-333-WERC.

## Adaptive Motorsports Capstone Kicks Off

The Air Force Academy is embarking on a meaningful stream of research combining cutting edge research solutions for both disabled populations and the warfighter. A new partnership between Falci Adaptive Motorsports, FalconWorks, Craig Hospital, Ball Aerospace, Air Force Research Laboratory (AFRL), and the Air Force Academy will challenge cadets to develop technologies that allow patients with spinal cord injuries to drive a racecar. The team will study the use of these same technologies to help disabled veterans and to provide combat airmen with novel operator interface solutions.

The interdisciplinary nature of the WERC will bring numerous behavioral science capabilities to the team including Human Factors, Systems Engineering, and Biopsychology insights. Numerous planning meetings were held this Spring in addition to an AFRL visit to discuss the project with researchers from various AFRL technical directorates.

"This project represents an outstanding opportunity for AFRL and USAFA to come together with industry partners to accomplish meaningful science that serves both a critical need for disabled persons as well as setting the stage for advancing warfighting capabilities," Dr. James Christensen, AFRL Lead.

Toyota generously donated two NASCAR racecars to the project. The first year's goal is to provide a technology demonstration at the Talladega NASCAR event in May 2016.


*Above: Members of the Adaptive Motorsports racecar research team attend the Craig Hospital 2015 PUSH Dinner including BGen Armacost (DF), Dr. Falci, Maj Cooper (DFSE), Mr. Stewart (Falconworks), Dr. Christensen (AFRL), Capt Celaya (WERC), and Ms. Schuster (WERC). Left: Cadets drive a simulator at Ball Aerospace in Dayton, Ohio that is controlled by head gestures—no hand or feet controls are used.*

# WERC Cognitive Neuroscience Lab Supports National Concussion Research

Concussion researchers at USAFA are leading the nation by performing the first exhaustive battery of concussion baseline tests for the entire cadet wing.

The WERC's Cognitive Neuroscience Lab – headed by Assistant Professors Chris D'Lauro, Ph.D. and LCDR Brian Johnson, Ph.D. – has taken the lead on researching concussions at USAFA. "We think that USAFA's military-academic environment and mandatory sports participation make this a unique and compelling place to study concussions," said LCDR Brian Johnson.


*The USAFA concussion research team. From left to right: LtCol Jon Jackson (10th MDG), Col Darren Campbell (10th MDG), LtCol Laura Baugh (10th MDG), LCDR Brian Johnson (WERC), Barbara Cooley (10th MDG), LtCol Dain Allred (10th MDG), Dr. Jerry McGinty (AD) and Dr. Chris D'Lauro (WERC)*

It was this unique military-academic status that led the NCAA and Department of Defense to include USAFA as a research site for its multi-university $30 million Grand Alliance longitudinal concussion study. Under D'Lauro and Johnson's direction, the project got off to a running start: all Intercollegiate (IC) athletes completed cognitive baseline testing before Fall 2014 classes started.

All research sites for this collaboration – including USAFA, University of Michigan, UCLA, and 15 others – agreed to administer the same tests and the same post-injury care. "Usually, each school has its own concussion protocol. By agreeing to use the same measures and treatments, we can aggregate data from all the sites and enter them into one big database," said D'Lauro.

Building from the momentum of this NCAA study, D'Lauro and Johnson directed an unprecedented effort to collect concussion baselines from the entire USAFA incoming class of 2018. "Concussion baselines provide cadets with better health information should they be concussed," said LCDR Johnson. "They also give researchers like us a more accurate picture of concussions at USAFA."

## Remotely Piloted Aircraft Research Takes Flight

Remotely Piloted Aircraft (RPA) are the future of our Air Force. While the technologies to design and employ advanced unmanned aircraft is rapidly advancing, the science behind their implementation is arguably lagging. The WERC takes a unique, interdisciplinary approach to solving RPA topics from a Behavioral Science perspective.

Drs. Wil Scott and Karin DeAngelis are sociologists exploring the effects of distributed commander decision making in a complex military context. They provide cadet commanders with live RPA surveillance information and manipulate environmental and social factors to assess their impact on commander decision making.

LtCol Jim Kajdasz, an intel analyst with a PhD in quantitative psychology, is investigating the effects of spatial distance between decision makers and battlefield features on the formulation of mental models pertaining to that battlespace. RPAs are a natural context to explore this topic.

While recent research is uncovering the mental health burden of conducting overseas RPA military operations from state-side locations, the impact of these operations on co-located military families is unknown. Mrs. Michaela Schuster is a German Armed Forces Psychologist exploring this vital research area.

LtCol McClernon and Dr. Finomore are actively pursuing a Human Factors Engineering RPA research effort looking at issues like touch screen data entry, display symbology, and electronic checklists for RPA operations.

This Spring the WERC hosted a local USAFA RPA meeting with attendees from numerous disciplines and centers. In June, the WERC will host a visit by RPA researchers from the University of Notre Dame and Zurich, Switzerland. In November, WERC researchers will travel to Zurich to discuss future RPA research collaborations and projects.

# The future looks bright for Air Force Research Laboratory collaborations

In 2013, the director of AFRL's Human Effectiveness Directorate (AFRL/RH), Mr. Jack Blackhurst, supported the conception of the WERC and two years later the collaboration with AFRL is in full swing.

Dr. Victor Finomore, engineering research psychologist in the Battlespace Acoustics Branch (RHCB), was competitively selected as a USAFA Distinguished Visiting Researcher (DVR) for the 2014-2015 academic year. As DVR, Dr. Finomore stood-up the Multimodal Research Laboratory for Innovation (MuRLIn) a multi-purpose, reconfigurable research laboratory which was designed to supplement AFRL research capabilities.

*Cadets Andrew Chaves and Austin Sellers support BATMAN by testing portable displays for dismounted troops*

In the first year, Dr. Finomore was able to continue and expand upon his RHC research which resulted in 12 active data collection efforts. An example of this work can be seen in the seven research projects that directly supported AFRL's Battlefield Air Targeting Man-Aided kNolwegle (BATMAN) team. In addition to directly supporting advanced technology development, his efforts provided cadets first hand experience conducting applied research that directly supports the Warfighter.

After the success of this first year, the continuous expansion of the MuRLIn, and with the support from AFOSR through seedling funding we have high expectations for the 2015-2016 academic year. We are incorporating more AFRL research projects into our portfolio and collaborating with more primary investigators in numerous behavioral science disciplines to enhance AFRL competencies. Additionally, we are looking forward to hosting more AFRL visitors to the WERC and show first hand these new capabilities.

# Researcher Profile: Captain Katrina Powell

Captain Katrina Powell graduated from the Virginia Military Institute in 2006 with degrees in Psychology and English. In her undergraduate studies, she studied self esteem, body image, and racial identity among African American females.

Captain Powell then entered the Air Force as a Behavioral Scientist and Human Factors Engineer at Edwards AFB, California where she also worked in curriculum standards at the Air Force Test Pilot School. She was then sponsored by the Academy's Department of Behavioral Sciences & Leadership (DFBL) to pursue a Masters degree in Psychology at Arizona State University where she investigated emotions and marital satisfaction of at-home military spouses during various phases of deployments. Upon graduation, Captain Powell was competitively selected for the Military Information Support Operations (MISO) career field and deployed in support of OPERATION ENDURING FREEDOM.

During her faculty tour in DFBL, Captain Powell conducted research on cultural diversity and minority sense of belonging at the Academy. She was competitively selected for the Clinical Psychology doctoral program at the Uniformed Services University of the Health Sciences (USUHS) where she will continue her current research. She says, *"Diversity is one of those words that gets thrown around a lot, but we want to bring awareness and attention to diversity. We can bring diversity into the Air Force, but how do we recognize our quality people, and get them to stay?"* Best of luck Captain Powell!

## Kudos Corner!!

**Lindsay Researcher of the Year:**
LCDR Brian Johnson

**Hendrix Excellence Award:**
Dr. Victor Finomore

**Paper of the Year:**
Dr. Karin DeAngelis

**First Quarter Award Winners:**
Capt Aaron Celaya (CGOQ)
LCDR Brian Johnson (FGOQ)
Dr. Victor Finomore (COQ)

**Second Quarter Award Winners:**
Capt Aaron Celaya (CGOQ)
Maj Buddy Lizzol (FGOQ)
Dr. Victor Finomore (COQ)

**The following department members are departing and were competitively selected for scholarly assignments**

Capt Monica Herrera
Mansfield Fellowship Program, Japan

Capt Katrina Powell
Doctoral Student, Uniformed Services University of the Health Sciences

Capt Ashley Pugh
Doctoral Student, Colorado State University

Cadet Andrew Chaves
Masters Student, Air Force Institute of Technology

## Potpourri Series

February: Post-Deployment Psychological Health and Interpersonal Problems among Air Force Mental Health Personnel
LtCol Wendy Travis (DFBL)

April: A Cognitively-Based Training System for IED Detection
Dr. Matthew Sharps (CSU-Fresno)

April: Rape Myth Acceptance Rates among the Cadet Wing
Dr. Karin DeAngelis & Dr. David McCone (DFBL)

May: Human Reasoning and Decision Making in Human-Machine Systems
Dr. Robert Patterson (AFRL)

## Recent publications & presentations

We were very busy publishing and presenting this academic year. In the last 10 months, cadets and faculty presented more than 50 scholarly presentations and published 11 articles and book chapters. Check soon for a complete listing of our publications and presentations at the WERC website (under development).

## In the Media

Technology aids Academy researchers, cadets
http://www.usafa.af.mil/news/story.asp?id=123439408

Human Factors capstone students reflect on warfighter research
https://youtu.be/l2fElhGUAI8

Cadets travel to International Symposium on Aviation Psychology in Dayton, Ohio
https://youtu.be/dYXg4U5JjnQ

## Who are we collaborating with?

Do you want to see your organization here? Contact us!


## The WERC Team

LCDR Brian Johnson, PhD
Deputy Director

Dr. Victor Finomore
Distinguished Visiting Researcher

Maj(s) Aaron Celaya
Program Manager

Mrs. Michaela Schuster
Senior Psychologist

ARRIVING THIS SUMMER:

Dr. Chris D'Lauro
Senior Research Scientist

Capt Jay Medenwaldt
Executive Officer

## WERC by the Numbers

Number of Researchers/Faculty: 38
Number of Students: 262
Staff: 7
Dedicated research labs: 5
Current budget: $612k

## Warfighter Effectiveness Research Center

HQ USAFA/DFBL
2354 Fairchild Drive, Suite 5L50
USAF Academy CO 80840-6228

719.333.WERC ph
719.333.8646 fax

Email: werc@usafa.edu
Url: www.usafa.edu/df/dfbl/werc.cfm